DECATHLON COMMUNICATIONS, INC.
7400 E. Harvard Avenue
Suite 208
Denver, Colorado 80231

Office (303) 755-7292
Fax (303) 755-2234

DOCKET FILE COPY ORIGINAL

RECEIVED
OCT 28 1993
FCC - MAIL ROOM

October 27, 1993

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C. 20554
VIA FEDERAL EXPRESS

Re: Reply comments in MM Docket No. 93-106

Dear Mr. Caton:

Transmitted herewith are the original and five copies of Decathlon Communications, Inc.'s Reply Comments in the above-referenced docket.

Should you have any questions with respect to the above matter, please contact me.

Very truly yours,

Martin S. Frankel
President

No. of Copies rec'd 0+5
List ABCDE

DOCKET FILE COPY ORIGINAL

BEFORE THE

FEDERAL COMMUNICATIONS COMMISSION

WASHINGTON, D.C.

In the Matter of:	)	
	)	
Amendment of Part 74 of the Commission's Rules with Regard to the Instructional Television Fixed Service	)	MM Docket No. 93-106

To: The Commission

REPLY COMMENTS OF DECATHLON COMMUNICATIONS, INC.

INTRODUCTION

Decathlon Communications, Inc. is currently developing a fully integrated compressed digital wireless cable system. It expects that this system will be available within one year. The technology employed is based on the MPEG 2 standard of the Motion Pictures Expert Group, the committee formed to establish an international standard for the compression of full motion video. MPEG 2 is an open standard and attached hereto as Exhibits A and B are diagrams showing its structure. Decathlon believes that MPEG 2 is quickly becoming the standard for both wireless and wired cable digital transmission systems. Decathlon had a real time demonstration of the decompression technology it is employing at the Wireless Cable '93 Convention in Orlando, Florida and more recently on September 20 at The Federal Communications Commission.

Recent comments to the Federal Communications Commission have suggested that an interim rulemaking be made for regulating the use of Channel Mapping and Channel Loading in ITFS systems. These comments have taken form in a "Compromise on Channel Loading." This Compromise would remain in effect until compressed digital video (CDV) transmission obsoleted the analog mapping/loading rules. It has been suggested that the Compromise would be in effect for three to five years, when CDV transmission would be expected to begin.

The main thrust of the Compromise is a balancing of control of ITFS licenses between ITFS licensees and MDS operators. There is nothing in the Compromise or the accompanying comments to suggest that Channel Loading (and system-wide scheduling) is ever detrimental to either party and should ever be discarded in favor of a return to Channel Mapping.

We contend that a sunset on Channel Loading is unnecessary, and furthermore, that it would delay the introduction of CDV service by confusing the system specifications for CDV. While the Commission may choose to review the rules of the Compromise that effect the balancing of control of ITFS licenses when CDV is introduced to the market, it should adopt Channel Loading as a permanent rule now.

We make these statements since CDV is not three to five years away. Rather, Decathlon Communications will be demonstrating its CDV system on-air in mid-1994. Decathlon expects to be in production of CDV set tops in 1994.

Since CDV transmission will multiply the number of programs that can be sent simultaneously on ITFS frequencies by a factor of four or greater, it can greatly enhance the ITFS Service, and should be encouraged and enabled rather than having the path to digital service complicated by multiple rulemakings.

TECHNICAL DISCUSSION

Digital Transmission Systems.

Digital transmission of telephone traffic at microwave frequencies has been occurring for years and is well understood. The major conceptual difference between these digital telephone transmission systems and digital systems for Wireless Cable is that the set top converter for Wireless Cable must cost only a few hundred dollars instead of thousands or tens of thousands of dollars. The question has been, not if Wireless Cable would be sent digitally, but when it would be economically viable to sent it digitally. Recent advances in available componentry and a means of inexpensively processing signals in the set top converter have

allowed Decathlon to create a CDV system which will bring economically-viable CDV to ITFS in months rather than years from now.

In a compressed digital video system, video programs are digitized and the picture information which is repetitious is removed. This data compression reduces the 120 megabits per second (mbps) required for uncompressed digital video down to a few megabits per second. This compressed data stream is then transmitted with a bandwidth-efficient modulation which fits several bits per second into each hertz of bandwidth. Quadrature amplitude modulation (QAM), quadrature partial response signalling (QPRS), and other modulations have been suggested for digital Wireless Cable.

Decathlon's system transmits four bits per second per hertz of bandwidth, fitting 24 mbps in a 6-MHz channel. This 24 mbps can be used for transmitting a single HDTV signal, four near-studio quality videos, or up to ten or more "VHS-quality" programs within the 6 MHz bandwidth that previously could contain only a <u>single</u> analog program.

<u>Multiplexing the Digitized Programs within a 6 MHz Bandwidth</u>.

Within the digital data stream, every "n^{th}" bit could be for the n^{th} program. For example, every third bit could be for program

number three. We refer to this as bit-by-bit multiplexing. Alternately, a packet of many bits could be sent for a given program, and then a packet for the next program, etc. We refer to this as packet-by-packet multiplexing.

The Decathlon system is using the MPEG 2 (Motion Picture Experts Group) international-standard image data compression system. MPEG 2 defines a complete messaging structure which includes the capability of recognizing data packets intended for the program the viewer has selected. This allows very simple packet-by-packet multiplexing to be done with MPEG 2. So, referring to Figure 1, if the MPEG 2 decompression circuitry is set to receiver "Program #3," then the packets for this program are recognized, separated from the other programs' packets, decompressed, and the video is displayed. As indicated in the figure, the packets do not have to be in any particular order.

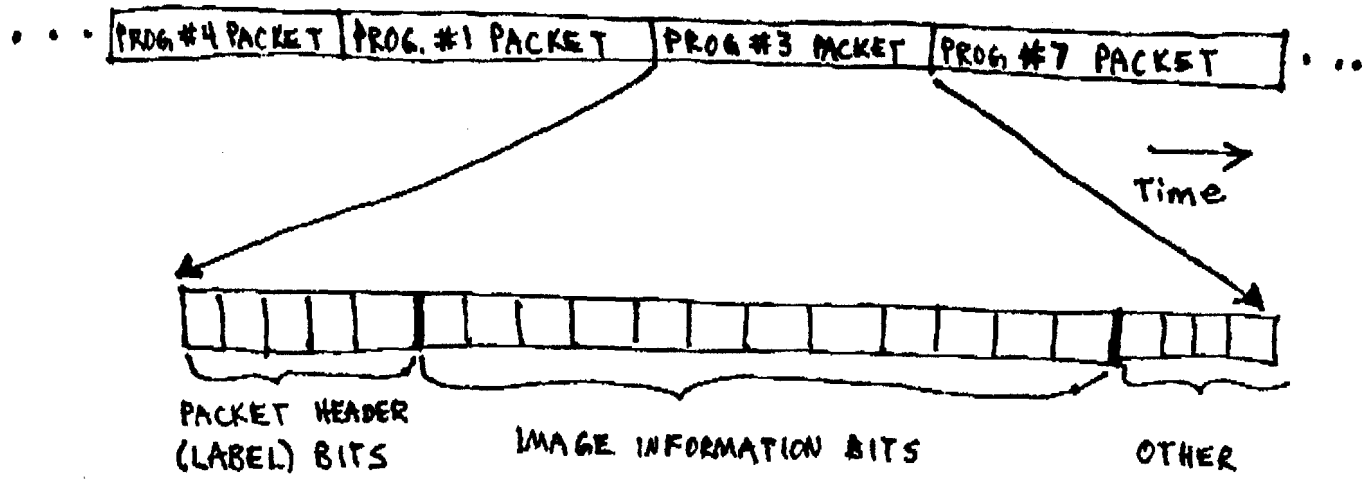


Fig.1. Separating Out The Desired Program

Channel Mapping and Channel Loading in Compressed Digital Systems.

Clearly, since "a bit is a bit," and "a packet is a packet," the concepts of Channel Mapping and Channel Loading do not apply well within the single combined data stream in a 6 MHz bandwidth. The concept of a "channel" within the 6 MHz bandwidth's continuous data stream is now fictitious: all that is done is that the packets are labeled, and this labeling can be anything. The MPEG 2 system will simply separate out the program whose label has been requested.

What of Channel Mapping and Channel Loading between 6 MHz bandwidths?

Channel Mapping in analog systems increases the complexity of set top converters, without increasing the total amount of educational programming available. Since there is no available programming-time advantage to Channel Mapping, and since it increases the complexity and cost (at least the software cost) of the system, it makes no sense to choose it over Channel Loading.

When the simplicity of Channel Loading is considered, and the fact that it is transparent to the ultimate programming users, then it is clear that Channel Loading is by far the best choice for technical and cost purposes.

If Channel Mapping adds complexity without any user benefit in the present analog systems, this will be even more true in compressed digital systems. Rather than simply instructing the set top converter to tune to another frequency (another 6 MHz band), the system will have to instruct the set top to tune to another 6 MHz band and tell it which of the "n" channels to select within that band. In the meantime, all of the other programs within that band will also have to "shuffle" at the same time. In this sense, if there are "n" programs within a 6 MHz band, then the problems with Channel Mapping in compressed digital systems are multiplied by a factor of "n" when compared to Channel Loading.

CONCLUSION

Compressed digital transmission of ITFS programs is upon us at the present time. Rulemaking on Channel Loading that sunsets when compressed digital video is introduced will be an exercise in futility, since it will have to be replaced almost as soon as it is enacted. Furthermore, there is no logical reason for ever discarding Channel Loading and returning to Channel Mapping.

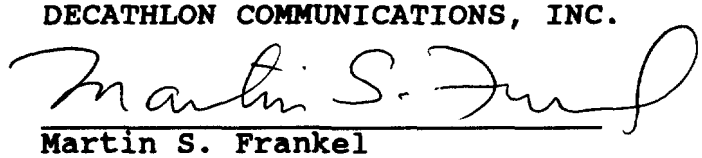
With the multiplication of available program capacity on ITFS bands, Channel Loading will have even greater benefits than it now has over Channel Mapping. Channel Loading should be selected as the method used for ITFS programming for this reason. Furthermore,

this selection will be transparent to the end user while making system control simpler and decreasing software (and potentially hardware) costs within these systems.

The hardware and software systems for CDV are being developed now and decisions whether to introduce the expense and complexity of Channel Mapping into the system are at hand. Channel Mapping, if not permanently replaced by Channel Loading, will increase the expense and impede the development of CDV to the benefit of none and the detriment of all.

Respectfully submitted,

DECATHLON COMMUNICATIONS, INC.



Martin S. Frankel
President
7400 E. Harvard Avenue
Suite 208
Denver, CO 80231
(303) 755-7292

October 27, 1993

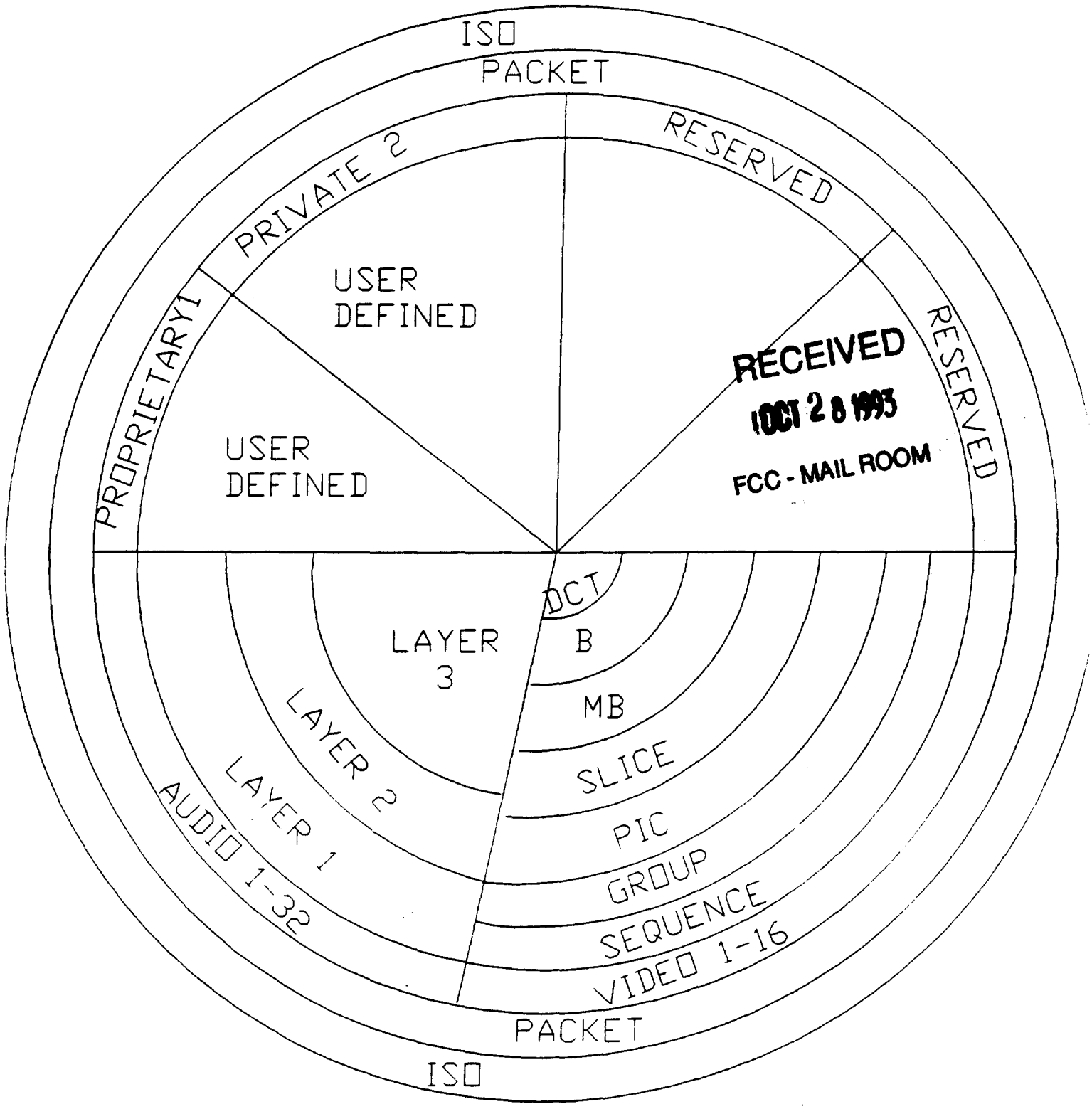


Figure 1: Layered Structure of MPEG

EXHIBIT A

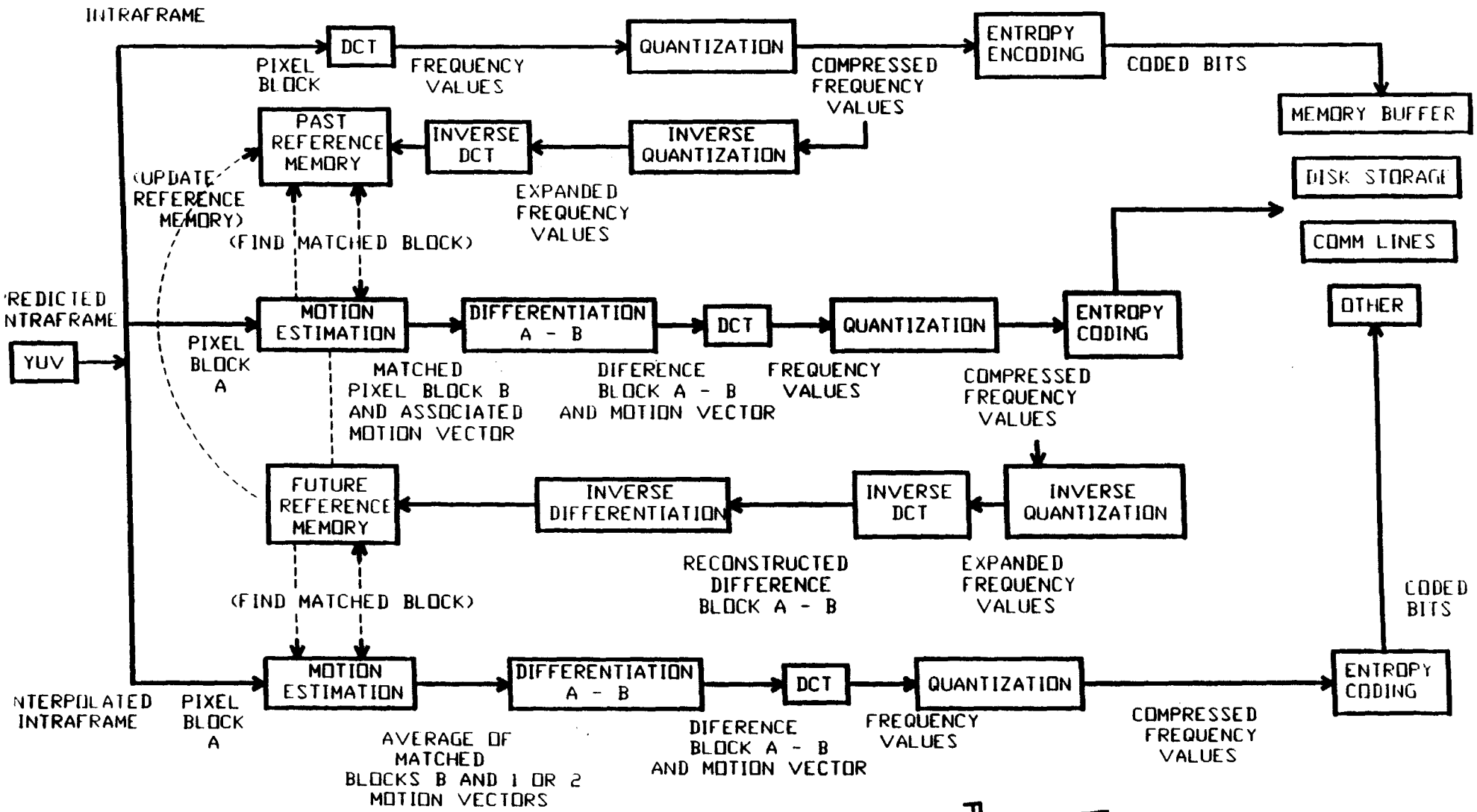


EXHIBIT B

CYNETICS CORPORATION